

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Research Laboratory of Electronics Personnel Record
(with Redactions for FDA use)

Date: April 11, 2003

Name: Donald K. Eddington

1. Date of Birth: Proprietary information
2. Citizenship: Proprietary information
3. Education:

<u>School</u>	<u>Degree</u>
University of Utah	BSEE
University of Utah	Ph.D.

4. Title of Thesis for Most Advanced Degree:

Auditory Prosthesis Research with Multiple Channel Intracochlear Stimulation in Man

5. Principal Fields of Interest:

Neural prostheses with an emphasis on cochlear implants

6. Name and Rank of MIT Faculty in the Same Field:

7. Name and Rank of Research Staff in the Same Field:

8. Non-MIT Experience (including military service):

<u>Employer</u>	<u>Position</u>	<u>Beginning</u>	<u>Ending</u>
University of Utah	Res.Asst.Professor	1979	1983
Harvard Med.School	Asst. Professor	1983	1992
Harvard Med.School	Assoc. Professor	1992	present

9. History of MIT Appointments:

<u>Rank</u>	<u>Beginning</u>	<u>Ending</u>
Postdoctoral Fellow		
Research Scientist	1983	1990
Principal Research Scientist	1990	present

10. Consulting Record:

<u>Firm</u>	<u>Beginning</u>	<u>Ending</u>
Advanced Bionics Corporation (periodically over the specified span)	1995	present

11. Department, Laboratory, and Institute Committees, Other Assigned Duties:

<u>Activity</u>	<u>Beginning</u>	<u>Ending</u>
Director, Keck Neural Prosthesis Research Center (scientific program spanning MIT, MEEI ¹ and DL ²)	1997	present

12. Professional service (selected):

<u>Activity</u>	<u>Beginning</u>	<u>Ending</u>
National		
NIH, Neural Prosthesis Program Advisory Committee	1983	1988
Gordon Conference on Implantable Auditory Prostheses, first elected Program Chair	1985	1985
NIH, Consensus Development Conference on Cochlear Implants	1988	1988
NIH, Consensus Development Conference on Cochlear Implants	1995	1995
FDA, Ear Nose and Throat Devices Panel (Consultant)	2001	2002
FDA, Ear Nose and Throat Devices Panel (Voting Member)	2002	present

12. Professional service (continued)

<u>Activity</u>	<u>Beginning</u>	<u>Ending</u>
Local		
MEEI ³ Human Studies Committee	1984	2002
MEEI Patent Committee (member)	1985	1998
MEEI Medical Board	1991	present
MEEI Dept. Otolaryngology Research Committee (chair)	1991	present

¹ Massachusetts Eye and Ear Infirmary

² Charles Stark Draper Laboratory

³ Massachusetts Eye and Ear Infirmary

MEEI Research Committee	1993	present
Harvard Medical School, Dept. Otology and Laryngology Executive Comm.	1997	1999
MEEI Patent Committee (chair)	1998	present

13. Awards Received:

<u>Award</u>	<u>Date</u>
Volta Award (for contributions to research in cochlear implants)	1997

14. Current Organization Membership:

<u>Organization</u>	<u>Offices Held</u>
Acoustical Society of America	
Institute of Electrical and Electronics Engineers	
American Association for the Advancement of Science	

15. Patents and Patent Applications Pending:

Teaching Experience of Donald K. Eddington

<u>Term</u>	<u>Subject Number</u>	<u>Title</u>	<u>Role</u>
FT84-present	MEEI	MEEI Residents' Basic Science Course	One lecture/year
FT86-FT92	6.551	Signal Processing by the Auditory System	Two lectures/year
FT90-F98	HST-130	Introduction to Neuroscience	One lecture/year
FT02-present	HST-130	Introduction to Neuroscience	One lecture/year
ST93	HST-720	Physiology of the Ear	One lecture/year
ST96-present	HST-790	Research Approaches to Speech and Hearing	Course director

Publications of Donald K. Eddington

1. Books

2. Papers in Refereed Journals

1. Stensaas S.S., Eddington D.K. and W.H. Dobbelle, "The Topography and Variability of the Primary Visual Cortex in Man," *Journal of Neurosurgery* 40, 747-755, 1974.
2. Mladejovsky M.G., Eddington D.K., Dobbelle W.H. and D.E. Brackmann, "Artificial Hearing for the Deaf by Cochlear Stimulation: Pitch Modulation and Some Parametric Thresholds," *Transactions of the American Society for Artificial Internal Organs* 21, 1-7, 1975.
3. Mladejovsky M.G., Eddington D.K., Evans J.R., and W.H. Dobbelle, "A Computer Based Stimulation System to Investigate Sensory Prostheses for the Blind and Deaf," *Institute of Electrical and Electronics Engineers Transactions on Biomedical Engineering*, 23, 286-296, 1976.
4. Eddington D.K., Dobbelle W.H., Brackmann D.E., Mladejovsky M.G. and J.L. Parkin, "Auditory Prostheses Research with Multiple Channel Intracochlear Stimulation in Man," *Annals of Otolology, Rhinology and Laryngology*, 87(Suppl. 53), 1-39, 1978.
5. Eddington D.K., Dobbelle W.H., Brackmann D.E., Mladejovsky M.G. and J.L. Parkin, "Place and Periodicity Pitch by Stimulation of Multiple Scala Tympani Electrodes in Deaf Volunteers," *Transactions of the American Society of Artificial Internal Organs*, 24, 1-5, 1978.
6. Kiang, N.Y.S., Eddington D.K. and B. Delgutte, "Fundamental Considerations in Designing Auditory Implants," *Acta Otolaryngology* 87, 204-218, 1979.
7. Eddington D.K., "Speech Discrimination in Deaf Subjects with Cochlear Implants. *Journal of the Acoustical Society of America* 68, 885-891, 1980
8. Eddington D.K., "Speech Recognition in Deaf Subjects with Multichannel, Intracochlear Electrodes," *Annals of the New York Academy of Sciences* 405, 241-258, 1983.

9. Parkin J.L., Eddington D.K., Orth J.L. and D.E. Brackmann, "Speech Recognition Experience with Multichannel Cochlear Implants," *Otolaryngology, Head and Neck Surgery*, 93, 639-645, 1985.
 10. Wilson B.S., Finley C.C., Lawson D.T., Wolford R.D., Eddington D.K. and W.M. Rabinowitz, "Better Speech Recognition with Cochlear Implants," *Nature* 352, 236-238, 1991.
 11. Rabinowitz W.M., Eddington D.K., Delhorne L.A., and P.A. Cuneo, "Relations Among Different Measures of Speech Reception in Subjects Using a Cochlear Implant," *Journal of the Acoustical Society of America* 92, 1869-1881, 1992.
 12. Rabinowitz W.M. and D.K. Eddington, "Effects of Channel-to-Electrode Mappings on Speech Reception with the Ineraid Cochlear Implant," *Ear & Hearing* 16, 450-458, 1995.
 13. Litvak, L., Delgutte, B. and D.K. Eddington, "Auditory Nerve Fiber Responses to Electric Stimulation: Modulated and Unmodulated Pulse trains," *Journal of the Acoustical Society of America* 110, 368-379, 2001.
 14. Nadol J.B., Shiao J.Y., Burgess B.J., Ketten D.R., Eddington D.K., Gantz B.J., Kos I., Montandon P., Coker N.J., Roland J.T. and J.K. Shallop, "Histopathology of Cochlear Implants in the Human", *Annals of Otology, Rhinology and Laryngology* 110, 883-891, 2001.
 15. Chao T-K., Burgess, B.J., Eddington, D.K., and J.B. Nadol, "Morphometric changes in the cochlear nucleus in patients who had undergone cochlear implantation for bilateral profound deafness. *Hearing Research* 174, 196-205, 2002.
3. Proceedings of Refereed Conferences
1. Eddington D.K. and J.L. Orth, "Speech Recognition in a Deaf Subject with a Portable, Multichannel Cochlear Implant System," in Cochlear Implants, Schindler and Merzenich, eds., Raven Press 1985, pp. 277-282.
 2. Kiang N.Y.S., Guinan J.J., Liberman M.C., Brown M.C. and D.K. Eddington, "Feedback Control Mechanisms of the Auditory Periphery: Implications for Cochlear Implants," in Cochlear Implant: Current Situation, Banfai, ed., Bermann, 1988, pp. 131-151.

3. Eddington, D.K., Rabinowitz, W.M., and L.A. Delhorne, "Sound Processing for Cochlear Implants", Proceedings of the 2001 International Conference on Acoustics Speech and Signal Processing, Salt Lake City, UT, May 2001.

4. Other Major Publications

1. Eddington D.K., "Multiple Channel Intracochlear Stimulation," in Surgery of the Ear and Skull Base, Brackmann, ed., Raven Press, 1982, pp. 199-205.
2. Nadol J.B. and D.K Eddington, "Treatment of Sensorineural Hearing Loss by Cochlear Implantation," Annual Review of Medicine, 39, 491-502, 1988.
3. Litvak, L., Delgutte, B. and D.K. Eddington, "Responses of Auditory-Nerve Fibers to Sustained, High-Frequency Electric Stimulation I. Unmodulated Pulse Trains," Journal of the Acoustical Society of America (2002, submitted).
4. Litvak, L., Delgutte, B. and D.K. Eddington, "Responses of Auditory-Nerve Fibers to Sustained, High-Frequency Electric Stimulation II. Sinusoidal Modulators," Journal of the Acoustical Society of America (2002, submitted).
5. Litvak, L., Delgutte, B. and D.K. Eddington, "Responses of Auditory-Nerve Fibers to Sustained, High-Frequency Electric Stimulation III. Vowel Modulators," Journal of the Acoustical Society of America (2002, submitted).
6. Hall, R.D., Mazzoli, M., Vischer, M.F., Zhu, M.-Y., Paufler, P. and D.K. Eddington, "The electrically evoked auditory brainstem response (EABR) in the rat. I: Properties of the early waves," Hearing Research (2003, submitted).
7. Hall, R.D., Mazzoli, M., Zhu, M.-Y., Vischer, M. F. and D.K. Eddington, "The electrically evoked auditory brainstem response (EABR) in the rat. III: Growth functions of the early waves," Hearing Research (2003, submitted).

4. Internal Memoranda and Progress Reports

- 1-12. Eddington, D.K., "Speech Processors for Auditory Prostheses," NIH Contract N01-DC-2-2402, Quarterly Progress Reports 1-12, September 1992 - December 1995.

- 13-24. Eddington, D.K., "Speech Processors for Auditory Prostheses," NIH Contract N01-DC-6-2100, Quarterly Progress Reports 1-12, January 1996 – December 1998.
- 25-28. Eddington, D.K., "Speech Processors for Auditory Prostheses," NIH Contract N01-DC-2-1001, Quarterly Progress Reports 1-4, January 2002 – December 2003.

6. Invited Lectures (selected)

- 1981, "Multichannel Intracochlear Stimulation," 3rd International Workshop on Neurological Surgery, Los Angeles, CA.
- 1981, "Speech Reception with Cochlear Implants," International Society for Artificial Organs, Paris, France.
- 1982, "Multichannel Cochlear Implantation," University of Erlangen-Nurnberg, Erlangen, Germany.
- 1982, "Cochlear Implants: An Overview," American Speech and Hearing Association, San Antonio, TX.
- 1983, "Encoding Speech for Electric Stimulation," Association for Research in Otolaryngology, St. Petersburg, FL.
- 1983, "Speech Coding for Cochlear Implants," Department of Otolaryngology, University of California at San Francisco, San Francisco, CA.
- 1984, "Is There a Substitute for Hearing?," American Association for the Advancement of Science, New York City, NY.
- 1985, "Speech Reception with a Multichannel Cochlear Implant," Gordon Research Conference on Implantable Auditory Prostheses, Tilton, NH.
- 1985, "Speech Reception with Cochlear Implants," Department of Otolaryngology, University of Melbourne, Melbourne, Australia.
- 1986, "Cochlear Implants," Festschrift for W.J. Kolff, Division of Artificial Organs, University of Utah, Salt Lake City, UT.

- 1986, "Intracochlear Stimulation: An Example of a Successful Neuroprosthesis," 169th Meeting of the Electrochemical Society, Boston, MA.
- 1987, "Speech Coding for Cochlear Implants," Department of Otolaryngology, Rhinology and Laryngology, University of Geneva, Geneva, Switzerland.
- 1987, "A Three-Dimensional, Electro-Anatomical Model of the Implanted Cochlea," International Cochlear Implant Symposium, Duren, Germany.
- 1988, "Single vs. Multiple Channel Implants," NIH Consensus Development Conference, Bethesda, MD.
- 1988, "An Electroanatomical Model of the Cochlea," Kresge Hearing Institute, University of Michigan, Ann Arbor, MI.
- 1989, "The Ineraid Cochlear Implant," Department of Otolaryngology, Rhinology and Laryngology, University of Geneva, Geneva, Switzerland.
- 1989, "Speech Performance and Psychophysics," Engineering Research Conference on Implantable Auditory Prostheses, Potosi, MS.
- 1990, "Percutaneous Pedestals: Advantages, Disadvantages and Complications," The 9th International Otolaryngology Conference, Valbella, Switzerland.
- 1990, "Simultaneous Interaction in Auditory Prostheses," 21st NIH Neural Prostheses Workshop, Washington, DC.
- 1991, "Physiological Correlates of Psychophysics," The '91 Conference on Implantable Auditory Prostheses, Asilomar, CA.
- 1991, "Auditory Prostheses: Successes and Failures," 22nd NIH Neural Prostheses Workshop, Bethesda, MD.
- 1992, "Cochlear Implants: A Bright and Exciting Future," Keynote Address at the 1st International Symposium on Paediatric Cochlear Implantation, Queen's Medical Centre and School, Nottingham, UK.
- 1992, "An Electroanatomical Model of the Cochlea and the Interaction of Intracochlear Electrodes," University College London, London, UK.
- 1993, "Nonsimultaneous Interactions: Models and Psychophysics," 1993 Conference on Implantable Auditory Prostheses, Smithfield, RI.

- 1993, "Recent Developments in Sound Processing," Annual Conference on Science in Audiology, Bath, UK.
- 1994, "New Waveforms for Electric Stimulation," 25th NIH Neural Prostheses Workshop, Bethesda, MD.
- 1995, "Artificial Hearing: A Personal Perspective," Watterson Lecture, Case Western Reserve University, Cleveland, OH.
- 1995, "The Most Important Issues Facing Cochlear Implants," NIH Consensus Development Conference on Implants in Children and Adults, Bethesda, MD.
- 1996, "Models of Channel Interaction," 26th NIH Neural Prostheses Workshop, Bethesda, MD.
- 1997, "Intensity Coding in Cochlear Implants," Department of Otolaryngology, University of Washington, Seattle, WA.
- 1997, "Restoration of Normal Loudness Growth for CIS Sound Coding Strategies," 1997 Conference on Implantable Auditory Prostheses, Asilomar, CA.
- 1998, "Bilateral Intracochlear Stimulation," Department of Otolaryngology, University of Iowa, Iowa City, IA.
- 1998, "Using fMRI to Measure Brain Activation Patterns During Intracochlear Stimulation," 28th NIH Neural Prostheses Workshop, Bethesda, MD.
- 1999, "Information Available in Today's CIS Sound Processors," 1999 Conference On Implantable Auditory Prostheses, Asilomar, CA.
- 1999, "Cochlear Implant Sound Processing," 1999 Conference on Neural Information Processing, Denver, CO.
- 2000, "Signal Processing for Cochlear Implants," 2000 HST Forum Plenary Session, Cambridge, MA.
- 2000, "Behavioral Measures of Channel Interaction," European Cochlear Implant Investigators Conference, Amsterdam, Netherlands.

- 2001, "Simultaneous Electrode Interaction," 8th International Symposium on Cochlear Implants in Children, Los Angeles, CA.
- 2001, "Medial-Wall Electrodes and Interaction," 2001 Conference On Implantable Auditory Prostheses, Asilomar, CA.
- 2002, "Triphasic Stimulation Waveforms Reduce Nonsimultaneous Electrode Interaction," 7th International Conference on Cochlear Implants, Manchester, UK.
- 2002, "Sound-Processing Strategies for Cochlear Implants," Brown University.
- 2002, "Do Modiolar-Hugging Electrodes Reduce Electrode Interaction?" University of Utrecht, Netherlands.
- 2003, "Bilateral Cochlear Implants," Boston University.